

Report on Business

Your brain on Gucci

Economists used to think consumers made rational purchasing decisions. But a new field of research is revealing neural forces that leave classical theorists scratching their heads

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The evidence of purchase interruptus litters the checkout counters of every retailer across the nation—abandoned alligator gloves, the rejected digital camera that promised to add pop to the pixels, the discarded chocolate pretzels. Just before that moment of hand meeting wallet, something stops consumers in their tracks. They choke, can't close the deal and end up leaving the coveted items at the cash. Well, attention shoppers: Neuroscientists have dissected this familiar consumer flameout and identified the culprit. It's a wee bit of grey matter called the insula, and it's a hot topic in a new branch of brain research that's turning traditional economics on its head.

Buried beneath our cerebral cortex, the insula is a primitive structure that's home to the brain's emotional pain centre. Imaging scans have shown that this neural island can light up like a beacon in response to feelings of social exclusion or general distress, or in reaction to a disgusting odour.

Researchers have recently pegged the insula as a strong predictor of purchasing decisions—it seems to be the neural tightwad that anticipates the pain of payment immediately before a purchase. The more active the insula is, the less likely a shopper will be to shell out the extra bucks for a hot stock, a second putter or a pair of Jimmy Choos. Scott Rick, a Carnegie Mellon University researcher, describes the built-in panic signal this way: "Spending is piggybacking on regions designed for other things."

The concept is one of the more intriguing to flow from the young field of neuroeconomics—the budding and somewhat controversial science that investigates the brain circuits behind the financial choices people make. Top-flight business schools across North America now have dedicated courses in the field.

Classical economics is based on the idea that consumers are rational beings, equipped with a steely logic to further their best interests. But neuroeconomics upends the traditional thinking, shedding light on economists' surprisingly slow-burn realization that people often make bad money decisions: We splurge instead of saving for retirement. We sock our savings away instead of paying down debt. We toss coins into slot machines never expecting to win. Using functional magnetic resonance imaging (fMRI) machines that offer a snapshot of the thinking brain in action by tracking blood flow, researchers are finding that in matters of money, the human species is of two minds.

One comprises the highly evolved structures of the cerebral cortex—such as regions in the frontal lobe—which act like an internal CEO, deliberating to maximize profit and weighing the prospect of immediate gain against future pain, or vice versa. But the CEO is never alone. It's always at risk of a hostile takeover by what is often described as our lizard brain—the limbic system.

Tucked beneath the cortex, its ancient structures work on emotion and instinct, and concern themselves exclusively with needs in the present tense—igniting like a campfire the instant we're scared, hungry, horny, thirsty or hot. The limbic lizard includes the nucleus accumbens—the dopamine-fuelled pleasure centre where temptation trumps reason—and the insula, the neural knee-jerk to a price that's too high or to unfair treatment.

Mounting evidence suggests financial choices are the product of an unpredictable interplay between lizard and executive. In one test, called the "ultimatum game," in which researchers put \$20 up for grabs between two people, it seems the lizard—backed by the insula—usually dominates. Subjects are happy to split the money evenly when they are presented with that option, but when one person's share falls below half, to, say, \$5, they're so affronted by the injustice they walk away. "People will go against their own self-interest...even if the reaction cannot change the behaviour," says Michael Dorris, a neurophysiologist at Queen's University. "It really vexes economists."

An experiment published earlier this year offered physical evidence of the neural conflict in a brain gone shopping. Researchers from Stanford University, Carnegie Mellon and the Massachusetts Institute of Technology scanned the brains of 26 men and women as they were shown some 80 different products available to them at a discount. The items, which were valued at between \$8 and \$80 (U.S.), included everything from Godiva chocolates to key chain cameras, a Harry Potter box set and a USB flash drive. Each object appeared on a screen in front of test subjects for four seconds, followed by the price of the product for another four seconds. The subjects then had four seconds to decide whether to buy the product by hitting a button.

The experiment, published in the scientific journal *Neuron*, showed that the more subjects liked a product, the greater the activity in that pleasure-seeking nucleus accumbens. But once the price flashed before their eyes, activity shifted to the pain-sensing insula, says Carnegie Mellon's Scott Rick, who co-authored the report. If the price was less than they had expected to pay, blood also flowed to the medial prefrontal cortex, where the CEO calculated the cost benefits of buying. If the greatest amount of blood flow was in the insula, the study participants balked at the purchase; if it was in their pleasure centre and the prefrontal cortex, they bought. The pattern was consistent enough that researchers were able to predict when subjects would close a deal and when they would take a pass.

Another Carnegie Mellon research study has shown that while most of us can happily negotiate between the neural impulses to spend or not to spend, there are those who can rarely overcome the pain. There are indeed "tightwads" among us, scientists have found, for whom the pain of paying is so great that they cannot spend even when they want to and can afford to. Others, spendthrifts, cannot help but spend, even when they'd prefer to keep that purse closed.

To investigate these conflicts, the researchers designed a tightwad/spendthrift scale and then charted people's responses to questions about how and why they spend. Their answers shed light on what can make a purchase more or less painful. Simply adding the word "small" before the word "fee," for example, helped alleviate the anticipated pain of paying, even for tightwads. The researchers also found tightwads were likely to spend more money on investments rather than on consumables because the prospect of a future return lessened the immediate pain of paying.

Given the massive extent of North America's credit card debt, the scientists expected the survey results would suggest the underactive insula is the plague of the Western world. But surprisingly, in a survey of more than 2,000 people, tightwads slightly outnumbered spendthrifts. So why are so many North Americans so deeply mired in debt? Perhaps because slapping down a Visa is rarely as stressful as handing over cold hard cash. "If pain is what deters people from spending, it may explain why credit is so dangerous," Rick says. "It's less painful than paying with cash."

If there's a downside to this new understanding of the brain's activities, it may be that the research "will fall into the wrong hands," he says, giving marketers and advertisers even greater powers of persuasion. The online shopping experiment, for example, has already been flagged on neuromarketing.com as an attractive way to determine acceptable price points—with fMRI tests replacing focus groups.

At the same time, some are concerned that the field of neuroeconomics could become preoccupied with therapeutic applications designed to help people make better spending decisions. Picture the commercial: A middle-aged woman alone in her empty living room, staring aghast at another bill she can't pay, as the last of her furniture is being carted away. "In over your head?" the voice-over booms. "Time for a drug to halt runaway spending? Try Insula Boost and rouse your inner tightwad."

Still, researchers stress that drugs such as these are a long way off—not to mention a potentially tough sell for the pharmaceutical firms that might hope to market them. After all, notes Rick, "A spendthrift would have to be really convinced they need it."

Are you a tightwad or a spendthrift? Take the Carnegie Mellon researchers' survey [here](#).